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To: [Sanders](#)  
[Steven](#)  
CC:  
Date: 7/28/2014 12:42:14 PM  
Subject: RE: MEW 5 year review  
Attachments: [MEW third FYR draft.doc](#)

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As requested.

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US EPA Region 7 SUPR/MOKS  
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Principles and integrity are expensive, but they are among the very few things worth having.

---

**From:** Sanders, Steven  
**Sent:** Monday, July 28, 2014 1:02 PM  
**To:** Gravatt, Dan  
**Subject:** MEW 5 year review

Dan,

Do you have this document in electronic word format. I recall seeing some useful background language. Thanks.

Steve

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# **Third Five-Year Review Report**

**Missouri Electric Works Site  
Cape Girardeau  
Cape Girardeau County, Missouri**

**July, 2014**

**PREPARED BY:**

**United States Environmental Protection Agency  
Region 7  
Lenexa, Kansas**

Approved by:

Date:

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Cecilia Tapia  
Director  
Superfund Division  
U.S. EPA, Region 7

## Table of Contents

List of Acronyms .....	4
Executive Summary .....	6
Five-Year Review Summary Form .....	8
<b>I. Introduction .....</b>	<b>11</b>
<b>II. Site Chronology .....</b>	<b>12</b>
<b>III. Background</b>	
Physical Characteristics .....	15
Land and Resource Use .....	15
History of Contamination .....	16
Initial Response .....	16
Basis for Taking Action .....	17
<b>IV. Remedial Actions</b>	
OU-1 - Soil .....	18
OU-2 - Groundwater .... ..	18
Soil Remedy Implementation .....	19
<b>V. Progress Since the Last Five-Year Review .....</b>	<b>19</b>
<b>VI. Five-Year Review Process</b>	
Administrative Components .....	20
Community Involvement .....	21
Document Review .....	21
Data Review .....	21
Site Inspection .....	22
<b>VII. Technical Assessment</b>	
Question A: Is the remedy functioning as intended by the decision documents? .	22
Question B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy still valid? ....	24
Question C: Has any other information come to light that could call into question the protectiveness of the remedy? .....	26
<b>VIII. Issues .....</b>	<b>27</b>
<b>IX. Recommendations and Follow-up Actions .....</b>	<b>27</b>
<b>X. Protectiveness Statement(s) .....</b>	<b>28</b>

<b>XI. Next Review .....</b>	<b>28</b>
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**Tables**

- Table 1 – Chronology of Site Events
- Table 2 – Status of Recommendations from the last Five-Year Review
- Table 3 – Issues
- Table 4 – Recommendations and Follow-up Actions

**Figures**

- Figure 1 – Site Location Map
- Figure 2 – Extent of Soil Contamination (OU 1)
- Figure 3 – Approximate Groundwater Impact Area
- Figure 4 – Wetland Area

**Attachments**

- Attachment 1 – Published notice of third FYR start
- Attachment 2 – List of Documents Reviewed
- Attachment 3 – Five-Year Review Sampling Trip Report with Analytical Results
- Attachment 4 – FYR Site Inspection Checklist
- Attachment 5 – Environmental Services Division Technical Assessment Memorandum

## **List of Acronyms**

<b>Acronym</b>	<b>Definition</b>
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
BGS	Below Ground Surface
BHHRA	Baseline Human Health Risk Assessment
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CIC	Community Involvement Coordinator
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
DOJ	Department of Justice
ESD	Explanation of Significant Differences
FS	Feasibility Study
IC	Institutional Control
LTTD	Low Temperature Thermal Desorber
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDNR	Missouri Department of Natural Resources
MEW	Missouri Electric Works
MEWSC	Missouri Electric Works Steering Committee
MEWSTD	Missouri Electric Works Site Trust Donors
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCB	Polynuclear Biphenyl “Polychlorinated” per previous FYR
PCE	Perchloroethene
PIC	Product of Incomplete Combustion
PPB	Parts per Billion
PPM	Parts per Million

PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
TCE	Trichlorethylene
TI	Technical Impracticability
TSCA	Toxic Substances Control Act
USGS	United States Geological Survey
VOC	Volatile Organic Compound

## **Executive Summary**

The Environmental Protection Agency (EPA) has performed the third five-year review (FYR) for the Missouri Electric Works Superfund Site (Site) located in Cape Girardeau, Missouri. This review was initiated in December of 2013 and completed in June of 2014. The former Missouri Electric Works facility operated from 1954 until 1982 performing repairs and scrapping of transformers, capacitors and other electric equipment containing polychlorinated biphenyls (PCBs) in oils.

The soil remedy for the Missouri Electric Works Superfund site (Site) in Cape Girardeau, Missouri was selected in the 1990 Record of Decision for the soils operable unit (OU-1) included the excavation, processing, and treatment of Polychlorinated Biphenyl -(PCB) contaminated soils using thermal desorption technology. After treatment and analysis to confirm that treatment standards had been met, the treated soil was used to backfill the excavated areas. The entire area was capped with a contaminant-free soil. The upper one foot of the cap had organics added to support vegetation. The soil remedy was complete with the acceptance by the Environmental Protection Agency (EPA) of the Soil Remedial Action Report during September 2000. The trigger for the first five-year review (FYR) was the start of remedial action (RA) on-site construction, which occurred June 7, 1999.

The remedy for the groundwater portion of the remedy at the Missouri Electric Works Superfund site, designated OU-2, has not yet been fully implemented. A focused remedial investigation and feasibility study for groundwater has been conducted for the site. The EPA issued a second ROD in 2005 (2005 ROD) for OU-2 which addressed the two groundwater aquifers that had been impacted by contamination from the Site. A technical impracticability waiver for meeting the groundwater cleanup levels (maximum contaminant levels or MCLs), groundwater monitoring and institutional controls (ICs) were selected as components of the remedy for the contaminated groundwater in the fractured bedrock aquifer. Monitoring, ICs, and Enhanced In-situ Bioremediation (EISB) were selected as components of the remedy for the contaminated groundwater in the alluvium south of the MEW property. A contingent remedy including monitored natural attenuation (MNA) instead of EISB was also specified as an alternative if future data showed that MNA was occurring. These remedies have not yet been implemented. MNA data was collected in 2012-2013 which demonstrated MNA was ongoing, and an explanation of significant differences (ESD) was signed in 2013 which formally selected the contingent MNA remedy for the OU-2 alluvial aquifer.

The site assessment sampling conducted by EPA in 2014 for this FYR included sampling monitoring wells WSW-1, MW-3, MW-5, MW-11, MW-12, and cluster MW-16A/B/C. These samples were analyzed for PCBs (total and dissolved) and for volatile organic compounds (VOCs). No PCBs were found in the alluvial aquifer wells MW-16A/B/C, but low levels of trichloroethylene and daughter compounds were found in this well cluster. PCBs were found in MW-11 (a fractured bedrock aquifer well) on the former MEW site property at a concentration of 2.34 parts per billion (ppb) in the unfiltered sample. VOCs including trichloroethylene, benzene, and chlorobenzenes were found in the fractured bedrock aquifer wells.

Construction of new buildings, renovation of the existing building and associated earthmoving and regrading by the site owner on the former MEW property occurred in 2010-2011. EPA evaluated these activities in 2013 and determined that the remedy was still protective of human health and the environment. Further, EPA determined that the deed restriction placed on the site prior to implementing the soil remedy was no longer needed. An Environmental Covenant signed by the current property

owner (Fronabarger Concreters), the State of Missouri, and EPA was recorded in March, 2014.

The site assessment sampling conducted by EPA in 2014 as part of this FYR found PCBs at several locations in soil on the former MEW site and in the ravine leading downhill from the site to the wetlands area, at depths ranging from the surface down to six inches (the maximum depth sampled in these areas), and a maximum concentration of 42 mg/kg at six inches in sample UA-05-6”.

While there are no current human exposures to contaminated groundwater in the area, the remedies to address contaminated groundwater specified in the 2005 ROD have not yet been implemented due to the extended negotiations with the remaining PRPs on a Consent Decree to address the fractured bedrock aquifer remedy.

Wetlands adjacent to and downgradient of the site have been designated as OU-3. The site assessment sampling conducted by EPA in 2014 for this FYR found PCBs (Aroclor-1260) in several locations within the wetlands soils, at depths ranging from the surface down to five feet (the maximum depth sampled in this area), and a maximum concentration of 6.1 milligrams per kilogram (mg/kg) at 4 feet in sample LA-14-4’. Fish tissue sampling in the pond in the wetlands found PCBs at a concentration of 27 mg/kg. Additional investigation is required this area and an RI/FS is planned for OU-3. A separate Administrative Order with the PRPs to perform an RI/FS is planned.



## Five-Year Review Summary Form

### SITE IDENTIFICATION

**Site Name:** Missouri Electric Works

**EPA ID:** MOD980965982

**Region:** 7

**State:** MO

**City/County:** Cape Girardeau, Cape Girardeau County

### SITE STATUS

**NPL Status:** Final

**Multiple OUs?**

Yes

**Has the Site achieved construction completion?**

No

### REVIEW STATUS

**Lead agency:** EPA

**If “Other Federal Agency” was selected above, enter Agency name:**

**Author name (Federal or State Project Manager):** Dan Gravatt (EPA)

**Author affiliation:** Remedial Project Manager

**Review period:** December, 2013 – July, 2014

**Date of Site inspection:** March 25-27, 2014

**Type of review:** Statutory

**Review number:** 3

**Triggering action date:** 8/14/2009

**Due date (*five years after triggering action date*):** 8/14/2014

### Five-Year Review Summary Form (continued)

#### Issues/Recommendations

#### OU(s) without Issues/Recommendations Identified in the Five-Year Review:

OU-3.

#### Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU-2	<b>Issue Category: Monitoring</b>			
	<b>Issue:</b> Insufficient monitoring frequencies for groundwater, fractured bedrock and alluvial aquifers			
	<b>Recommendation:</b> Resolve CD negotiations with PRPs for fractured bedrock RD/RA and O&M; implement fund-lead RD/RA for alluvial aquifer			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA / State / PRPs	EPA/State	TBD

OU(s): OU-2	<b>Issue Category: Institutional Controls</b>			
	<b>Issue:</b> City and/or State Institutional Controls may need to be placed to prevent groundwater use in the area.			
	<b>Recommendation:</b> EPA should request that the City and the State implement appropriate ICs			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	City of Cape Girardeau / MDNR	EPA	TBD

OU(s): OU-1	<b>Issue Category: Remedy Performance</b>			
	<b>Issue:</b> Recent surface soil sampling detected PCBs above the 10 ppm cleanup standard specified in the OU-1 ROD near the former MEW building.			
	<b>Recommendation:</b> Additional sampling is required to confirm this			

	detection and delineate the impacted area.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
Yes	Yes	EPA	MDNR	July 31, 2016

### Protectiveness Statement(s)

<i>Operable Unit:</i> 01	<i>Protectiveness Determination:</i> Protectiveness deferred	<i>Addendum Due Date (if applicable):</i> July 31, 2016
<i>Protectiveness Statement:</i> The protectiveness determination for the soil remedy (OU-1) is deferred at this time, due to the recent discovery of PCB concentrations above the 10 ppm cleanup standard in surface soil at one location on the former MEW property. Additional investigation to confirm this result is needed.		
<i>Operable Unit:</i> 02	<i>Protectiveness Determination:</i> Protectiveness deferred	<i>Addendum Due Date (if applicable):</i> TBD
<i>Protectiveness Statement:</i> The groundwater remedy (OU-2) selected in the 2005 ROD and the 2013 ESD has not yet been implemented. However, there is currently no known use of groundwater from either the fractured bedrock or alluvial aquifers. Institutional controls have been placed on the MEW site. Routine groundwater monitoring is needed. Monitoring is being negotiated with the MEWSTD as part of the work effort pursuant to a consent decree. The protectiveness determination for the groundwater remedy is deferred until the remedy can be fully implemented and post-implementation groundwater data is collected.		

# **Missouri Electric Works Superfund Site Cape Girardeau, Missouri Third Five-Year Review Report**

## **I. Introduction**

The purpose of the Five-Year Review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues, if any, found during the review, and identify recommendations to address such issues.

The EPA is preparing this Five-Year Review report pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Section 121(c) provides:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 104 or 106 [of CERCLA], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The EPA has interpreted this requirement further in the NCP; 40 C.F.R. § 300.430(f)(4)(ii) provides:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.*

The EPA, Region 7, has conducted this Five-Year Review of the remedy implemented at the Missouri Electric Works (MEW) Superfund Site, in Cape Girardeau, Missouri. This review was conducted by Remedial Project Managers (RPMs) Dan Gravatt and Greg Bach for the entire site from December 2013 through July 2014. This report documents the results of the review.

This is the third Five-Year Review for the Missouri Electric Works Site. The triggering

action for this statutory review is completion of the second Five Year Review, which occurred on August 14, 2009. The Five-Year Review is required due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

The Site is divided into three operable units (OUs). OU1 addresses site soils. This remedy has been constructed. OU2 addresses site groundwater. The record of decision has been signed and some RD/RA activities are underway. OU3 addresses wetlands adjacent to and downgradient of the property. OU3 is in the RI/FS stage. This FYR will evaluate protectiveness at OU1 and OU2.

## II. Site Chronology

Table 1 – Chronology of Site Events

Event	Date
Site discovery	10/25/1984
EPA-lead Expanded Site Investigation conducted	05/01/1987
PRP search initiated	01/15/1988
PRP lead RI/FS initiated	12/31/1988
Site listed on the NPL	02/21/1990
Remedial Investigation (RI) report submitted to EPA	06/04/1990
Record of Decision (ROD) signed	09/28/1990
Special Notice letters sent	12/21/1990
Good Faith Offer received	03/04/1991
PRPs perform post-ROD groundwater investigation with EPA oversight	07/06/1991
RD/RA Consent Decree negotiations conclude	09/19/1991
Signed Consent Decree to sent to DOJ for lodging in federal court	12/30/1991
PRPs submit groundwater investigation report	01/09/1992

<b>Event</b>	<b>Date</b>
EPA “approves” groundwater report after review	03/19/1992
Late parties signed consent decree	06/15/1992
DOJ files complaint, lodges Consent Decree	06/29/1992
District Court enters Consent Decree	08/29/1994
<i>De minimis</i> parties make payments to MEW trust and Superfund	09/1994
Appeal filed by Intervenor	10/28/1994
Settling Defendants submit information on thermal desorbers and request EPA to review and change ROD	10/1994
McLaren-Hart petitions EPA HQ for National TSCA permit demonstration at MEW site	10/1994
Explanation of Significant Differences to ROD issued by EPA	02/01/1995
Pilot study using innovative low temperature/high vacuum thermal desorber unit	05/15/1995
8 <sup>th</sup> Circuit Court of Appeals remands Consent Decree to District Court	08/1995
McLaren-Hart submits report on demonstration test at the MEW site	06/1996
DOJ lodges Consent Decree (second time)	06/29/1996
District court re-enters Consent Decree	08/14/1996
Intervenor appeal re-entry of Consent Decree	10/07/1996
8 <sup>th</sup> Circuit Court of Appeals re-affirms District Court’s entry of Consent Decree	12/1997
Preliminary remedial design (RD) submitted	10/01/1998
Pre-final RD and draft Remedial Action Work Plan (RAWP) submitted	12/22/1998
100% RD and revised RAWP submitted	05/19/1999
RA on-site construction start	06/07/1999

<b>Event</b>	<b>Date</b>
Groundwater RI/FS start (OU 2)	06/12/2000
Final Inspection	09/19/2000
Remedial Action Report (OU 1) final approval	09/29/2000
Draft Baseline Human Health Risk Assessment (OU 2) submitted	07/28/2004
Draft Groundwater RI submitted (OU 2)	08/02/2004
Draft Groundwater FS submitted (OU 2)	07/30/2004
First Five Year Review	09/2004
Final Groundwater RI submitted	02/11/2005
Ecological Risk Screening Evaluation	06/2005
Final Groundwater FS submitted (OU 2)	07/05/2005
Baseline Human Health Risk Assessment (OU 2) approval	07/05/2005
Record of Decision (OU 2) signed	09/28/2005
Expanded Ecological Risk Screening Evaluation	06/2006
Erection of protective fence with signage around wetland pond	02/20/2007
Special Notice Letters for OU 2 and OU 3 issued	03/2009
Good Faith Offer from MEWSTD	05/2009
Consent Negotiations start for CD (OU 2 RD/RA; OU 3 RI/FS & RD/RA)	06/2009
Second Five-Year Review	08/2009
Monitored Natural Attenuation Sampling in Alluvial Aquifer	2012-2013
Former MEW Property purchased by Fronabarger Concreters	2010
New Owner renovates existing building and builds U-Store-It building	2010-2011

<b>Event</b>	<b>Date</b>
Explanation of Significant Differences for Alluvial Groundwater Remedy	11/2013
Site Inspection and Sampling for Third FYR	03/2014
Environmental Covenant with Current Site Owner Recorded	03/2014

### **III. Background**

#### **Physical Characteristics**

Missouri Electric Works, Inc. (MEW) operated on a 6.4 acre tract adjacent to U.S. Highway 61 (South Kingshighway) in Cape Girardeau. Figure 1 indicates the location of the site within the city limits of Cape Girardeau, Missouri. The site includes all areas which became contaminated with polychlorinated biphenyls (PCBs) originating from MEW's operations. Figure 2 indicates the extent of soil contamination that comprised OU 1. Figure 3 indicates the approximate groundwater impact area. The site is located in a predominantly commercial/industrial area of Cape Girardeau. The area surrounding the site has experienced significant development since the early 1990s when the site was listed on the National Priorities List (NPL).

The site is situated approximately 1.6 miles west of the Mississippi River. It is located in the hills adjacent to the west valley wall of the Mississippi River flood plain. Intermittent run-off channels emanate from the north, south and east boundaries of the site and eventually drain into the Cape LaCroix Creek which is located 0.7 miles east of the site. The Cape LaCroix Creek flows 1.1 miles to the southeast and enters the Mississippi River. The property is bounded on the north by retail and warehouse properties, on the south by a residence, commercial storage and a construction company, and on the east by a warehouse. A wetland is located approximately 700 feet south of the MEW property. Figure 4 indicates the approximate location of the wetland in relation to the MEW property and the city of Cape Girardeau.

#### **Land and Resource Use**

MEW purchased the property in 1952. Prior to that, it is believed that the land was used for agricultural purposes. MEW operated an electrical repair, service, and resell business from the location from 1954 to 1992. The facility discontinued operations in 1992 when the principal of MEW died.

In 2008, Mr. C.J. Morrill, president of Contrend, Inc., acquired the property through a foreclosure sale. In 2010, the property was purchased by Fronabarger Concreters, which constructed a U-Store-It building on site, renovated the former MEW building on-site, and regraded much of the surface of the property in 2011.



The current land use for the surrounding area is predominantly commercial. Soccer fields are located to the east of the site. New business construction continues near the site. It is expected that the land use in the area will not change significantly. The wetlands to the south of the Site are currently for sale.

## **History of Contamination**

MEW serviced, repaired, reconditioned, and salvaged electrical equipment from 1954 to 1992. Electrical equipment handled during this time consisted of oil-filled electrical transformers, electric motors, electrical equipment controls and oil-filled switches. PCBs, first manufactured in the 1920s, have excellent fire-retardant properties. PCBs were often added to the dielectric fluid in electrical equipment to minimize the potential for fires. The Toxic Substance Control Act (TSCA) of 1978 banned the future manufacture of PCBs and required that electrical equipment containing more than 500 parts per million (ppm) PCB be removed from service. This regulation resulted from studies which indicated that PCBs are a probable human carcinogen, they are extremely stable in the environment (they do not degrade) and they bio-accumulate in the food chain. The products of incomplete combustion of PCBs are dioxins and furans.

During its operational history, MEW reportedly recycled materials from old units, selling copper wire, and reusing the dielectric fluids from the transformers. The salvaged transformer oil was filtered through Fuller's earth for reuse. An estimated 90 percent of the transformer oil was recycled. According to business records obtained from MEW, more than 16,000 transformers were repaired or scrapped at the site during its time of operation. The total amount of transformer oil that was not recycled was estimated to be 28,000 gallons. Information gathered during interviews of former employees indicates that the majority of the non-recycled oil was disposed of on the site. In 1984, approximately 5,000 gallons of waste oil was removed by a contractor after the TSCA inspection by the Missouri Department of Natural Resources (MDNR).

Industrial solvents were used to clean the electrical equipment being repaired or serviced. Solvents were reused until they were no longer effective. Spills and disposal of spent solvents on the MEW property were described by past employees during EPA-conducted interviews. The MEW and adjacent properties have been found to be contaminated with PCBs.

## **Initial Response**

The site was discovered in 1984 during a TSCA inspection. PCB contaminated soils and inappropriate storage of over 100 55-gallon drums of PCB-contaminated oils were identified. EPA performed additional investigations to characterize the amount of contamination between 1985 and 1988. EPA issued an administrative order requiring that the owner/operator of the site no longer handle any oil-filled electrical equipment with PCB concentrations greater than 2 ppm, that erosion barriers be placed in all drainage features to minimize the amount of PCB contamination migrating off-site via storm water runoff, and that vegetables grown on site not be sold or given away to anyone outside of the site owner's immediate family.

The site was proposed for inclusion on the National Priorities List (NPL) on June 24, 1988, and finalized on the NPL on February 21, 1990. Former MEW customers were informed of their

potential liability beginning in June of 1988. A steering committee of former customers known as the Missouri Electric Works Steering Committee (MEWSC) was formed. The MEWSC performed a Remedial Investigation/Feasibility Study (RI/FS) during 1989 and 1990. The 1990 OU-1 ROD selected thermal desorption of PCB-contaminated soils as the preferred remedy. This remedy was implemented in 1999-2000.

A RI/FS for the groundwater was required pursuant to the Consent Decree for OU 1 (soils). The Missouri Electric Work Site Trust Donors (MEWSTD) began the groundwater RI/FS in 2000 and completed it in 2004. The 2005 OU-2 ROD selected a technical impracticability-based remedy for the fractured bedrock aquifer, and an enhanced in-situ bioremediation remedy (with a contingent remedy of monitored natural attenuation) for the alluvial aquifer.

### **Basis for Taking Action**

Hazardous substances that have been released to the site in each media include:

#### **Soil**

PCBs  
methylene chloride  
trichloroethene  
trichloroethane  
chlorobenzene

#### **Groundwater**

1,1-dichloroethane	1,1,1-trichloroethane
1,2-dichloroethene (total)	1,1-dichloroethene
chlorobenzene	1,2,4-trichlorobenzene
trichloroethene	1,2-dichlorobenzene
tetrachloroethene	1,3-dichlorobenzene
benzene	1,4-dichlorobenzene
PCBs	

#### **Sediment**

PCBs

#### **Air**

PCBs

A Human Health Risk Assessment (HHRA) of the site was performed by the MEWSC during 1990. The HHRA indicated that contamination in soil at the Site presented an unacceptable risk to human health and the environment. The principal threat from the Site was due to human exposure to the PCB-contaminated soils. The analyses were based on "most probable case" and "worst case" exposure scenarios. Potential risks associated with exposure to groundwater are attributed to the presence of chlorinated compounds that exist at concentrations that exceed state maximum contaminant levels (MCLs).

A Baseline Human Health Risk Assessment (BHHRA) was performed by the Settling Defendants during 2004 which specifically evaluated the groundwater contaminants associated with MEW activities. A total of fifty-two (52) COPCs were retained and evaluated in the BHHRA. The analyses performed indicated that groundwater impacted by Site contamination presents an unacceptable risk to human health. These human health risks are the result of chemicals released to the environment during the operations of MEW.

Ecological risks were not fully evaluated during the previous investigations at the site. Ecological risk will be further evaluated as part of the RI/FS for OU3.

## **IV. Remedial Actions**

### **OU 1 – Soils**

The ROD for OU-1 was issued by EPA on September 28, 1990. The major components of the source control remedy selected in the 1990 ROD included the following:

1. Excavation and on-site thermal treatment of all soils with PCB concentrations in excess of 10 ppm to a depth of four (4) feet and 100 ppm at depths greater than four (4) feet. (Note: the PRPs subsequently agreed to treat to 10 ppm at all depths, and this was accomplished.)
2. Backfill excavated areas using treated soils, after analytical tests confirm that treatment standards are met.
3. Restoration and revegetation of the Site, including a surface layer of organic-rich soil to support vegetation.
4. Impose institutional controls, such as deed restrictions and/or zoning restrictions to limit use of the site to industrial or commercial purposes.

A 1994 Explanation of Significant Differences was issued to include thermal desorption as a potential thermal treatment for soils; the 1990 ROD specified incineration only. The soils remedy was completed in 2000. The 1990 ROD also included a remedy for groundwater at the site; however, this remedy was not implemented and was superseded by the 2005 OU-2 ROD.

### **OU 2 – Groundwater**

The 2005 ROD was issued on September 28, 2005. Two distinct groundwater regimes were identified during the RI; groundwater in fractured bedrock and groundwater in alluvium underlying the wetland area.

As discussed above, EPA has determined that, due to the hydrogeological conditions at the site, it is technically impracticable from an engineering perspective to comply with the relevant and appropriate requirement of achieving MCLs in remediating the groundwater in the fractured bedrock, and accordingly, a TI waiver of this requirement for the fractured bedrock was invoked by EPA in the 2005 ROD. The major components of the migration management remedy selected for the fractured bedrock groundwater in the 2005 ROD include:

- ICs;
- wellhead treatment (where appropriate); and
- long-term groundwater monitoring.

The TI waiver for the fractured bedrock was needed due to the highly variable and fractured nature of the bedrock in the Upland Area of the site.

The major components of the remedy selected for the alluvial groundwater in the 2005 ROD include:

- ICs;
- wellhead treatment;
- long-term groundwater monitoring; and
- injection of EBD agents into the alluvial groundwater (with a contingent MNA remedy).

An Explanation of Significant Differences was signed in November 2013, based on MNA sampling conducted in 2012-2013, that formally selected the contingent MNA remedy for the alluvial aquifer. The MNA sampling demonstrated evidence for the occurrence of MNA and a slow decreasing trend in contaminant concentrations in the alluvial aquifer. The OU-2 remedies have not yet been fully implemented due to ongoing negotiations with the PRPs on a Consent Decree that would compel them to perform the remedial action for the fractured bedrock aquifer component of OU-2.

### **Soil Remedy Implementation**

After several years delay due to legal proceedings, the contract for thermal treatment of the soils was awarded on August 25, 1998. The remedial design was conditionally approved on March 25, 1999. On-site mobilization, clearing and grubbing efforts began on June 7, 1999. Thermal treatment of the PCB-contaminated soils was completed on July 25, 2000. The work for the soils operable unit (OU) was finished with the approval of the Remedial Action Report on September 29, 2000. The EPA and the state of Missouri have determined that all work identified in the CD has been substantially performed. No long-term operation and maintenance activities were required in the CD. There are no operation and maintenance activities being performed, though institutional controls are in place via an environmental covenant that was placed in early 2014. This covenant placed certain restrictions on how the former MEW property could be used, including a prohibition on residential use.

## **V. Progress Since the Last Five-Year Review**

Since the second Five-Year Review for the Site, the following progress has been made:

- Negotiations with the PRP group continued on a Consent Decree for RD/RA for the fractured bedrock portion of OU-2
- Four quarters of Monitored Natural Attenuation sampling were performed in 2012-2013
- An Explanation of Significant Differences to select the OU-2 alluvial aquifer contingent remedy of MNA was signed in November, 2013
- An Environmental Covenant with the current Site owner was recorded in March, 2014
- A site inspection and sampling of groundwater, soil and fish tissue for this FYR was conducted in March, 2014

Table 2: Status of Recommendations from the last FYR:

Recommendation / Follow-up Action	Party Responsible	Projected Milestone Date	Current Status
1. Institutional controls not placed with regards to groundwater	Property owners, City of Cape Girardeau, State of Missouri	9/30/2010	Environmental covenant placed on former MEW property in 2014; additional city/state ordinances may be placed
2. Insufficient monitoring frequencies for groundwater; fractured bedrock and alluvium	PRPs	09/30/2010	Not completed by PRPs due to lengthy and ongoing CD negotiations; EPA MNA sampling partially addressed the issue for the alluvial aquifer
3. Ecological risk assessment not conducted for wetland area south of the MEW facility	PRPs	09/30/2012	A screening-level ERA was performed in June 2006 for the Wetlands area. A baseline ERA will be required as part of the future OU-3 RI/FS investigation by the PRPs.
4. Additional sediment/soil assessment needed to determine whether PCBs are present in the wetland area	PRPs	09/30/2011	Not completed by PRPs due to lengthy and ongoing CD negotiations; EPA sampling in 2014 for this FYR addresses this issue.
5. Maintenance to secure the property, replace monitoring well locks and remove compromising vegetation, and maintain security fencing	PRPs	09/30/2009	Completed March, 2010

## VI. Five-Year Review Process

### Administrative Components

Members of the MEWSTD and the community were notified of the third Five-Year Review start during December 2013. The MEW Five-Year Review was performed by Dan

Gravatt and Greg Bach, EPA Remedial Project Managers (RPMs). Don Van Dyke and Jeremy Wall of Missouri Department of Natural Resources assisted in the review as the representatives for the support agency.

The review included the following components:

- Community involvement
- Document review
- Data review
- Site inspection
- Five-Year Review report development and review

These efforts were performed from December 2013 through July 2014.

### **Community Involvement**

A notice was published in the Southeast Missourian newspaper in Cape Girardeau in December, 2013 that the third Five-Year Review was to be conducted (Attachment 1).

### **Document Review**

This Five-Year Review consisted of a review of relevant documents including the Remedial Action report, groundwater monitoring data, ecological screening assessment, MNA sampling results and OU-2 alluvial aquifer ESD. The documents reviewed are listed in Attachment 2.

### **Data Review**

Data collected since the last FYR includes the four quarterly groundwater MNA sampling rounds of the monitoring wells in the wetlands area from 2012-2013 and the soil, groundwater and fish tissue sampling conducted in March 2014 in support of this FYR. The FYR sampling results are included as Attachment 3.

The results of the MNA quarterly groundwater sampling indicated that concentrations of VOCs in the alluvial aquifer show a slow declining trend, and that geochemical parameters in the aquifer can support MNA processes. Of the VOCs detected in the alluvial wells, only trichloroethylene slightly exceeded its MCL in wells MW-16B and MW-16C, with a maximum concentration of 11 ppb detected in the 2006 sampling event (sampling conducted by the PRPs).

The FYR sampling in 2014 included fractured bedrock monitoring wells WSW-1, MW-3, MW-5, MW-11, MW-12, and alluvial aquifer well cluster MW-16A/B/C. These samples were analyzed for PCBs (total and dissolved) and for volatile organic compounds (VOCs). No PCBs were found in the alluvial aquifer wells MW-16A/B/C, but low levels of trichloroethylene and daughter compounds were found in this well cluster. PCBs were found in MW-11 (a fractured bedrock aquifer well) on the former MEW site property at a concentration of 2.34 parts per billion (ppb) Aroclor-1260 in the unfiltered sample. VOCs including trichloroethylene, benzene, and

chlorobenzenes were found in the fractured bedrock aquifer wells.

The FYR sampling conducted found PCBs at several locations in soil on the former MEW site and in the ravine leading downhill from the site to the wetlands area, at depths ranging from the surface down to six inches (the maximum depth sampled in these areas), and a maximum concentration of 42 mg/kg at six inches in sample UA-05-6”.

The FYR sampling conducted in the wetlands area south of the Site found PCBs (Aroclor-1260) in several locations within the wetlands soils, at depths ranging from the surface down to five feet (the maximum depth sampled in this area), and a maximum concentration of 6.1 milligrams per kilogram (mg/kg) at 4 feet in sample LA-14-4’. Fish tissue sampling in the pond in the wetlands found PCBs (Aroclor-1260) at a concentration of 27 mg/kg.

### **Site Inspection**

Inspection of the site was performed on March 25-27, 2014 by Greg Bach of EPA, accompanied by Jeremy Wall of MDNR. Results of the inspection are documented in the Site Inspection Checklist (Attachment 4). The new owner of the former MEW property has regraded much of the Site, renovated the original MEW building, and constructed a U-Store-It building on the southwest part of the site. These actions disturbed much of the surface and subsurface soil at the site. Wells on the former MEW property were somewhat overgrown and difficult to access, and the well locks were difficult to open. The fence around the wetlands pond is overgrown with vegetation but apparently undamaged. There is no evidence of trespassing or vandalism.

## **VII. Technical Assessment**

**Question A-** Is the remedy functioning as intended by the decision document?

The PCB contaminated soil on site has been removed and treated on-site. However, the recent sampling on-site identified current surface soil contamination above the 1990 ROD standard of 10 ppm. According to the 2005 ROD, PCB contamination was detected to the top of the bedrock. The source areas for groundwater impacts are thought to be contamination remaining in the soil in the area of wells MW-3/5/11 on the southeast portion of the site and the former transformer storage area.

The selected remedy for OU-2 has not been fully implemented at the site. Groundwater impacts in the bedrock may flow into the alluvium. Institutional controls will apparently be implemented or imposed to prevent exposure to the contaminated groundwater thereby limiting potential exposure and human health risk concerns.

A remedy has not been selected for the wetland area. A remedial investigation and feasibility study is warranted to evaluate selection and implementation of an appropriate remedy in the wetlands area.

- *Is the selected remedy adequate for this site?* The OU-1 remedy included excavation and thermal desorption to treat approximately 38,000 tons of PCB impacted soil at the site. This

remedy was appropriate for the site; however, the recent detection of PCBs in subsurface soil may indicate that some contamination above the 10 ppm cleanup standard remains. As indicated, a TI waiver for fractured bedrock was issued due to the highly variable and fractured nature of the bedrock aquifer. An ESD for groundwater was issued in 2013 for the OU-2 alluvial aquifer that changed the remedy from enhanced biodegradation to monitored natural attenuation (EPA, 2013). This remedy has not been fully implemented at the site. The OU-2 remedy also provided for wellhead treatment in the event private wells become impacted; a plan to assess and mitigate such impacts will be part of the remedial action.

- *Is the plume stable?* Monitoring frequencies during this FYR period for all site associated wells has been insufficient to adequately evaluate plume stability or contaminant trends. For this FYR, the alluvial wells have been sampled four times over two years (2012 – 2013). Some of the bedrock wells were sampled during the 2014 FYR sampling event. We recommend periodic sampling frequencies be increased.
- *Do contaminant trends indicate the remedy is adequate?* The remedy for OU-2 has not been implemented at this site. As indicated, monitoring frequencies are inadequate and contaminant trends in the alluvial aquifer for the portion of the FYR period prior to the 2012-2013 MNA sampling events cannot be evaluated at this site. Contaminant trends in the bedrock aquifer cannot be assessed as those wells have not been sampled regularly during the FYR period.

#### Vapor Intrusion (VI) Pathway

- *Are the COCs of sufficient volatility and toxicity to warrant a VI investigation?* There are VOCs of sufficient volatility and toxicity that have been detected in groundwater at this site. However, not all site associated wells have been sampled during this FYR period. The alluvial wells were last sampled in March 2014. COC concentrations detected in those wells are not sufficient to warrant a VI investigation. No current receptors are present in the area of the alluvial wells. On-site wells were last sampled in March 2014.
- *Has a VI Investigation been conducted at this site?* No, a VI investigation was not conducted at this site. Concentrations of several COCs detected in groundwater during the last on-site event could potentially present a VI concern. Although, unless there are occupied structures, only a future use scenario would apply. If there are occupied structures, a mitigating factor would be the near surface site geology which consists of 15 ft to 25 ft of silt underlain by gravelly clay. These finer materials would inhibit vapor transport.
- *Is the VI pathway complete? If complete, has the VI concern been adequately mitigated to insure protectiveness?* A VI investigation was not conducted at this site. Unless there are currently occupied structures, the VI pathway will not be complete. The only occupied structure is the former MEW building which has been renovated and hosts a business. The monitoring well adjacent to this building, WSW-1, was sampled as part of the five-year review sampling in 2014. It contained trichloroethylene at a concentration of 6.5 parts per billion, with a water level of approximately 36 feet below ground surface. Based on this information, it is unlikely that the VI pathway is complete.



**Question B** – Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

#### Changes in Standards and TBCs

☐ *Have there been changes to risk-based cleanup levels or standards identified as Applicable or Relevant and Appropriate Requirements (ARARs) in the Record of Decision (ROD) that call into question the protectiveness of the remedy?*

Soil Operable Unit: We are not aware of any changes to risk-based cleanup levels or to standards identified as ARARs, which call into question the protectiveness of the remedy currently in place. The ROD of September 1990 (EPA, 1990), called for the excavation of all soils and sediments with PCB concentrations greater than 10 parts per million (ppm) to a depth of 4 feet, and soils below that depth with PCB concentrations greater than 100 ppm. Excavated soils were then to be incinerated on-site, and the ash and clean soil returned to the excavated areas as backfill. This remedy was later modified to add thermal desorption to the thermal treatment component of the remedy (EPA, 1995). The cleanup went beyond the requirements of the ROD in that all sediments and soils contaminated with greater than 10 ppm were excavated, regardless of depth (France-Isetts, 2000).

Groundwater Operable Unit: We are not aware of any changes to risk-based cleanup levels or to standards identified as ARARs, which call into question the protectiveness of the remedy currently in place. The September 1990, ROD (EPA, 1990) identified a pump and treat system as the selected groundwater remedy. However, subsequent investigation of site geology determined that this remedy could not be implemented effectively due to the nature of the fractured bedrock aquifer (Komex, 2005a, 2005b). Consequently, a technical impracticability evaluation was completed (Komex, 2005c) for the bedrock aquifer, with the result that a new groundwater alternative was selected. This alternative consists of institutional controls to prevent use of the contaminated groundwater, the installation of any well-head treatments system found to be necessary in order to treat a potable water supply, and long-term groundwater monitoring (EPA, 2005).

Wetlands Operable Unit: Chronic National Ambient Water Quality Criteria, as well as the State of Missouri's water quality criteria, should be considered ARARs for surface water when a remedy is selected for OU-3. Currently, the chronic NAWQC for total PCBs in surface water is 0.014 µg/L. To date, there are no sediment or fish tissue ARARs that would impact a future ROD for OU-3.

☐ *Are there newly promulgated standards that call into question the protectiveness of the remedy?* We are not aware of any newly promulgated standards that call into question the protectiveness of the remedy.

☐ *Have TBCs used in selecting cleanup levels at the site changed in way that could affect the protectiveness of the remedy?* The 2005 ROD identifies the need for consideration of TBCs in the alluvium, including contaminant toxicity factors found in the IRIS and the EPA risk assessment guidance. Once the groundwater monitoring plan is implemented, we would recommend that these

TBCs also be considered during any wellhead treatment efforts undertaken relative to the groundwater in fractured bedrock. Consideration of current contaminant toxicity factors and the EPA risk assessment guidance could potentially increase the protectiveness of the remedy.

#### Changes in Exposure Pathways

- ☐ *Has land use or expected land use on or near the site changed (e.g., industrial to residential, commercial to residential)?* Additional buildings were constructed on the former MEW site in 2011. However, the land use is still commercial.
- ☐ *Have any human health or ecological routes of exposure or receptors changed or been newly identified (e.g., dermal contact where none previously existed, new populations or species identified on site or near the site) that could affect the protectiveness of the remedy?* The recent discovery of PCBs above the 10 ppm cleanup standard in surface soils on the Site represents a potential new exposure route which requires further evaluation. The identified ecological exposures in the wetland area will be characterized as part of the OU-3 RI/FS.
- ☐ *Are there newly identified contaminants or contaminant sources?* We are not aware of any newly identified contaminants or contaminant sources.
- ☐ *Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents (e.g., byproducts not evaluated at the time of remedy selection)?* We are not aware of any unanticipated toxic byproducts.
- ☐ *Have physical site conditions (e.g., changes in anticipated direction or rate of groundwater flow) or the understanding of these conditions (e.g., changes in anticipated direction or rate of groundwater flow) changed in a way that could affect the protectiveness of the remedy?* PCB concentrations greater than 10 ppm were found in the surface soil during the 2014 FYR sampling. Groundwater sampling data does indicate the continued presence of contamination at concentrations greater than the EPA's regulatory levels (Komex, 2005d). This is not unexpected since the Feasibility Study recognized that, due to the nature of site geology, "Residual human health risks from COC [contaminants of concern] in groundwater would remain for an unknown period and ICs would be required for an indefinite period to ensure protectiveness" (Komex, 2005b). Site conditions in the wetland area will be characterized as part of the OU-3 RI/FS.

#### Changes in Toxicity and Other Contaminant Characteristics

- ☐ *Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy?* Many of the non-carcinogenic and carcinogenic toxicity factors identified in the RODs have been updated. In particular, the EPA has developed new screening levels for contaminants which may be carcinogenic by a mutagenic mode of action. However, these new levels focus on a potential direct contact route of exposure to the contaminants by children. The concentrations of the newly discovered surface soil PCBs should be compared with the new levels for mutagenic compounds.
- ☐ *Have other contaminant characteristics changed in a way that could affect protectiveness*

*of the remedy?* We are not aware of any other changes to contaminant characteristics that could impact the protectiveness of the remedy.

#### Changes in Risk Assessment Methods

☐ *Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?* The EPA has revised several of its methodologies since the completion of the ROD, including its dermal risk assessment guidance, its process for estimating the health risks from inhalation of volatile organic compounds during household use of contaminated groundwater (i.e., bathing, showering, cooking, etc.), the use of the Integrated Exposure Uptake Biokinetic Model and the Adult Lead Methodology to evaluate potential health risks from lead, the means by which the EPA evaluates the vapor intrusion pathway, and the means by which it evaluates compounds which are carcinogenic by a mutagenic mode of action. The EPA has also changed the toxicity values for a number of compounds since the signing of the original ROD. However, these changes in methodology and toxicity values do not adversely affect the protectiveness of the remedy currently in place at the site. Standardized methods for ecological risk assessment can be found in Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments - Interim Final (EPA, 1997).

**Question C** – Has any other information come to light that could call into question the protectiveness of the remedy?

*Have newly found ecological risks been found?* Ecological receptors at the site have been identified and will be addressed as part of the OU-3 RI/FS. An inadequate screening level ecological risk assessment was performed for the wetland area and associated drainage by the responsible parties (ENVIRON, 2006). The sampling conducted in 2014 identified PCBs in wetlands soil and in fish tissue from the pond in the wetlands area. Based on the information provided in the draft SLERA and the 2014 sampling, as well as the nature of the contaminants on site (PCBs), we recommend that a baseline ecological risk assessment be completed as part of the OU-3 RI/FS.

☐ *Are there impacts from natural disasters (e.g., a 100-year flood)?* We are not aware of any natural disasters that have occurred on this site.

☐ *Has any other information come to light which could affect the protectiveness of the remedy?* The recent detection of PCBs in surface soil on the former MEW property warrants additional investigation. The 2005 ROD stated that long-term groundwater monitoring would be one component of the selected remedy. This monitoring has not yet begun due to lengthy negotiations with the PRPs on a Consent Decree to perform this work.

The 2005 ROD also stated that institutional controls were components of the ROD. An Environmental Covenant was signed by MDNR, EPA and the current MEW site owner and recorded in 2014. Additional ICs may be placed by the City or the State of Missouri.

The 2005 ROD also included a provision for establishing wellhead protection in the event a drinking water supply well should become contaminated with site COCs. This provision has not

yet been implemented due to lengthy negotiations with the PRPs on a Consent Decree to perform this work.

The Third Five-Year Review Technical Assessment memorandum generated by expert hydrogeologists, human health risk assessors and ecological risk assessors in EPA Region 7's Environmental Services Division is included as Attachment 5. Note that the recent 2014 FYR sampling data was not available at the time their memorandum was prepared; their conclusions and recommendations as presented in this section have been updated to reflect this data.

## VIII. Issues

Table 3 – Issues

Issue	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Insufficient monitoring frequencies for groundwater, fractured bedrock and alluvial aquifers	N	Y
City and/or State Institutional Controls may be placed to prevent groundwater use in the area	N	Y
Recent surface soil sampling detected PCBs above the 10 ppm cleanup standard specified in the OU-1 ROD near the former MEW building	N	Y

## IX. Recommendations and Follow-up Actions

Table 4 – Recommendations and Follow-Up Actions

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Insufficient monitoring frequencies for groundwater, fractured bedrock and alluvial aquifers	Resolve CD negotiations with PRPs for fractured bedrock RD/RA and O&M; implement fund-lead RD/RA for alluvial aquifer	PRPs EPA MDNR	State/ EPA	TBD	N	Y

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
City and/or State Institutional Controls may be placed to prevent groundwater use in the area	EPA should request that the City and the State implement appropriate ICs	City of Cape Girardeau MDNR	EPA	TBD	N	Y
Recent surface soil sampling detected PCBs above the 10 ppm cleanup standard specified in the OU-1 ROD near the former MEW building	Additional sampling is required to confirm this detection and delineate the impacted area	EPA	MDNR	July 31, 2016	N	Y

## **X. Protectiveness Statement**

The protectiveness determination for the soil remedy (OU-1) is deferred at this time, due to the recent discovery of PCB concentrations above the 10 ppm cleanup standard in surface soil at one location on the former MEW property. Additional investigation to confirm this result is needed.

The groundwater remedy (OU-2) selected in the 2005 ROD and the 2013 ESD has not yet been implemented. However, there is currently no known use of groundwater from either the fractured bedrock or alluvial aquifers. Institutional controls have been placed on the MEW site. Routine groundwater monitoring is needed. Monitoring is being negotiated with the MEWSTD as part of the work effort pursuant to a consent decree. The protectiveness determination for the groundwater remedy is deferred until the remedy can be fully implemented and post-implementation groundwater data is collected.

## **XI. Next Review**

The fourth Five-Year Review for the Site is required by August 2019, five years from the date of this review.

## Attachment 1 – Published notice of third FYR start

## Attachment 2 – List of Documents Reviewed

1990 OU-1 Record of Decision  
1994 OU-1 Explanation of Significant Differences for thermal treatment technologies  
2005 OU-2 Record of Decision  
2005 Komex groundwater monitoring reports  
2009 Second Five-Year Review  
2012-2013 Monitored Natural Attenuation sampling reports and analytical data  
2013 ESD for OU-2 Alluvial Aquifer contingent remedy selection  
2014 Environmental Covenant  
2014 Five-Year Review Sampling Trip Report and analytical data

## Attachment 3 – Five-Year Review Sampling Trip Report with Analytical Results



## Attachment 4 – FYR Site Inspection Checklist

**Attachment 5 – Environmental Services Division Technical Assessment  
Memorandum**